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BUK7Y18-75B

N-channel TrenchMOS standard level FET

1 March 2013

Product data sheet

1. General description

Standard level N-channel enhancement mode Field-Effect Transistor (FET) in a plastic package using NXP High-Performance Automotive (HPA) TrenchMOS technology. This product has been designed and qualified to the appropriate AEC standard for use in automotive critical applications.

2. Features and benefits

- Q101 compliant
- Suitable for standard level gate drive sources
- Suitable for thermally demanding environments due to 175 °C rating

3. Applications

- 12 V, 24 V and 42 V loads
- Automotive systems
- DC-to-DC converters
- Engine management
- General purpose power switching
- Motors, lamps and solenoids
- Transmission control

4. Quick reference data

Table 1. Quick reference data

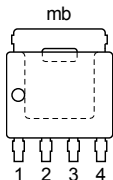
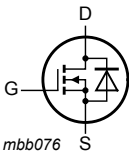
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ °C}; T_j \leq 175\text{ °C}$	-	-	75	V
I_D	drain current	$V_{GS} = 10\text{ V}; T_{mb} = 25\text{ °C};$ Fig. 1 ; Fig. 4	-	-	49	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ °C};$ Fig. 2	-	-	105	W
Static characteristics						
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 20\text{ A}; T_j = 25\text{ °C};$ Fig. 12 ; Fig. 13	-	13.8	18	mΩ
Dynamic characteristics						
Q_{GD}	gate-drain charge	$I_D = 20\text{ A}; V_{DS} = 60\text{ V}; V_{GS} = 10\text{ V};$ Fig. 14	-	14.24	-	nC



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Avalanche ruggedness						
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 49\text{ A}$; $V_{sup} \leq 75\text{ V}$; $R_{GS} = 50\ \Omega$; $V_{GS} = 10\text{ V}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; unclamped	-	-	118	mJ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	S	source	 <p>LFPAK56; Power-SO8 (SOT669)</p>	 <p><i>mbb076</i></p>
2	S	source		
3	S	source		
4	G	gate		
mb	D	mounting base; connected to drain		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BUK7Y18-75B	LFPAK56; Power-SO8	Plastic single-ended surface-mounted package (LFPAK56; Power-SO8); 4 leads	SOT669

7. Marking

Table 4. Marking codes

Type number	Marking code
BUK7Y18-75B	71875B

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage	$T_j \geq 25\text{ }^\circ\text{C}$; $T_j \leq 175\text{ }^\circ\text{C}$	-	75	V
V_{DGR}	drain-gate voltage	$R_{GS} = 20\text{ k}\Omega$	-	75	V
V_{GS}	gate-source voltage		-20	20	V
I_D	drain current	$T_{mb} = 25\text{ }^\circ\text{C}$; $V_{GS} = 10\text{ V}$; Fig. 1; Fig. 4	-	49	A

Symbol	Parameter	Conditions	Min	Max	Unit
		$T_{mb} = 100\text{ }^{\circ}\text{C}$; $V_{GS} = 10\text{ V}$; Fig. 1	-	34.9	A
I_{DM}	peak drain current	$T_{mb} = 25\text{ }^{\circ}\text{C}$; pulsed; $t_p \leq 10\text{ }\mu\text{s}$; Fig. 4	-	198	A
P_{tot}	total power dissipation	$T_{mb} = 25\text{ }^{\circ}\text{C}$; Fig. 2	-	105	W
T_{stg}	storage temperature		-55	175	$^{\circ}\text{C}$
T_j	junction temperature		-55	175	$^{\circ}\text{C}$
Source-drain diode					
I_S	source current	$T_{mb} = 25\text{ }^{\circ}\text{C}$	-	49	A
I_{SM}	peak source current	pulsed; $t_p \leq 10\text{ }\mu\text{s}$; $T_{mb} = 25\text{ }^{\circ}\text{C}$	-	198	A
Avalanche ruggedness					
$E_{DS(AL)S}$	non-repetitive drain-source avalanche energy	$I_D = 49\text{ A}$; $V_{sup} \leq 75\text{ V}$; $R_{GS} = 50\text{ }\Omega$; $V_{GS} = 10\text{ V}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; unclamped	-	118	mJ
$E_{DS(AL)R}$	repetitive drain-source avalanche energy	Fig. 3	[1][2][3]	-	J

- [1] Single-pulse avalanche rating limited by maximum junction temperature of 175 $^{\circ}\text{C}$.
- [2] Repetitive avalanche rating limited by an average junction temperature of 170 $^{\circ}\text{C}$.
- [3] Refer to application note AN10273 for further information.

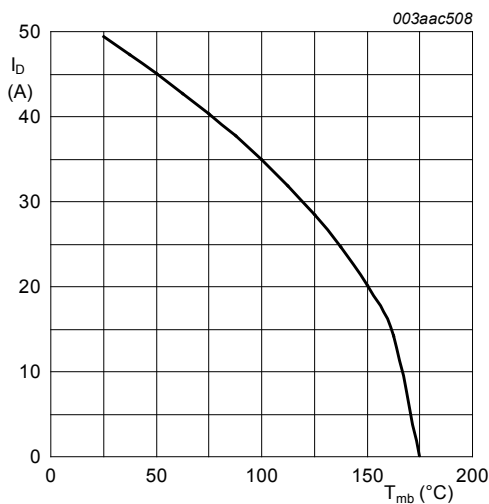


Fig. 1. Continuous drain current as a function of mounting base temperature

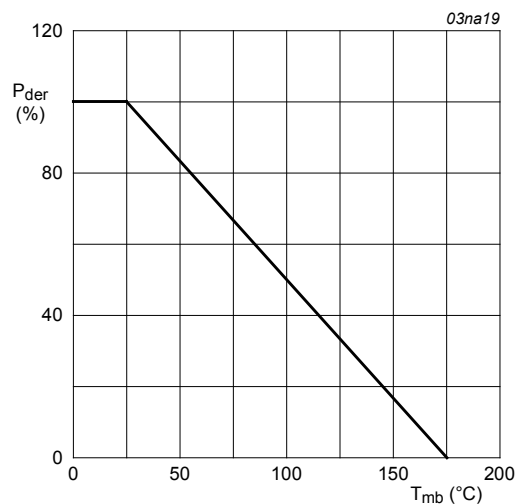
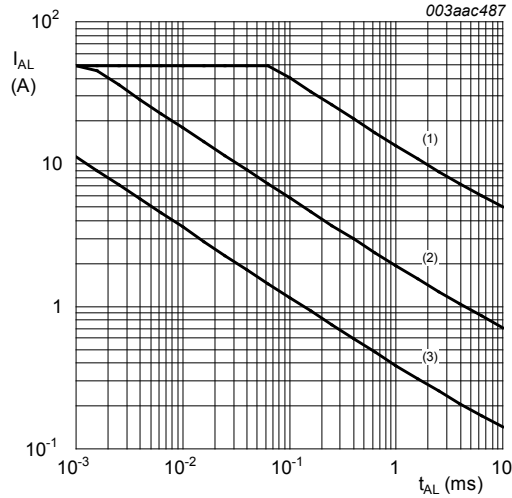


Fig. 2. Normalized total power dissipation as a function of mounting base temperature

$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100\%$$



- (1) Single pulse; $T_j = 25^\circ\text{C}$.
- (2) Single pulse; $T_j = 150^\circ\text{C}$.
- (3) Repetitive.

Fig. 3. Single-pulse and repetitive avalanche rating; avalanche current as a function of avalanche time

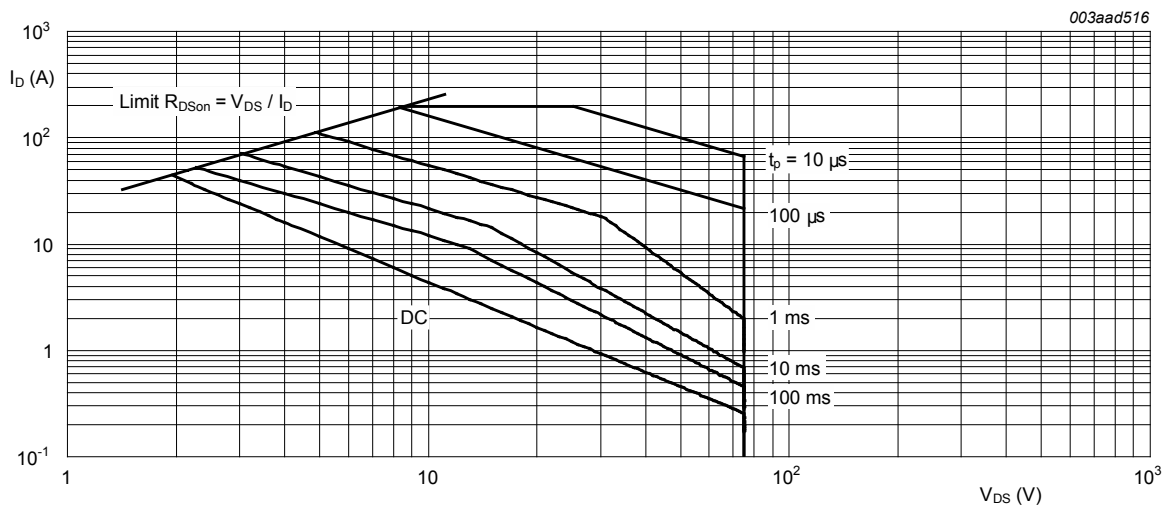


Fig. 4. Safe operating area; continuous and peak drain currents as a function of drain-source voltage.

$T_{mb} = 25^\circ\text{C}; I_{DM}$ is single pulse

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5	-	-	1.42	K/W

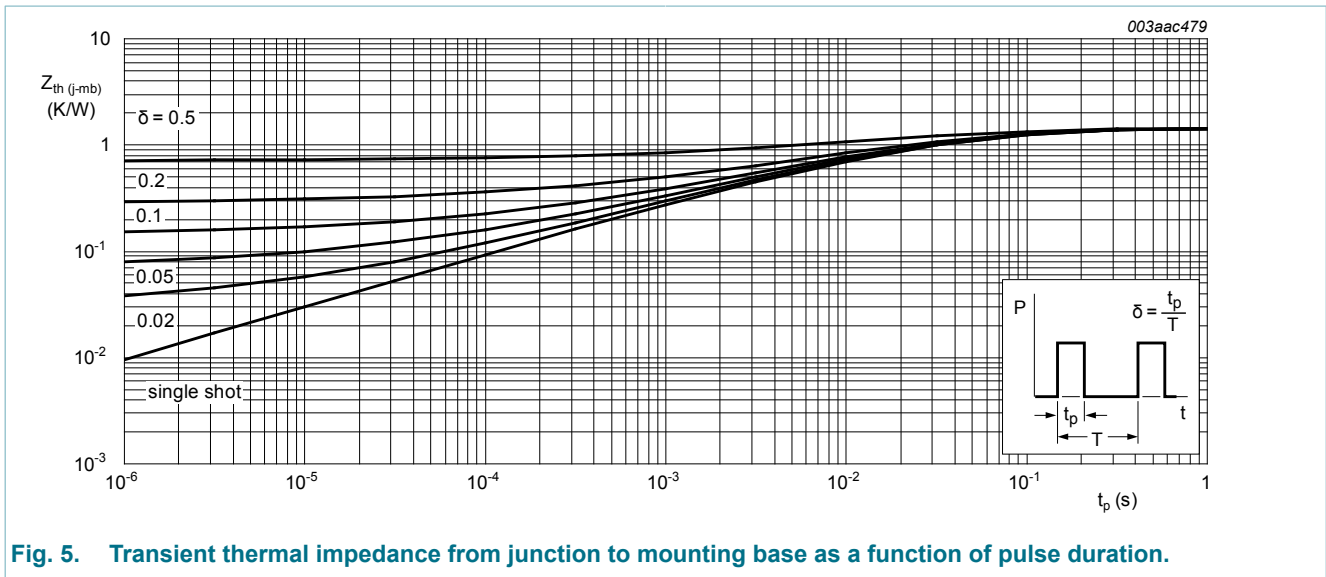


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
$V_{(BR)DSS}$	drain-source breakdown voltage	$I_D = 250 \mu A; V_{GS} = 0 V; T_J = 25 \text{ }^\circ C$	75	-	-	V
		$I_D = 250 \mu A; V_{GS} = 0 V; T_J = -55 \text{ }^\circ C$	68	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = 25 \text{ }^\circ C;$ Fig. 10 ; Fig. 11	2	3	4	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = -55 \text{ }^\circ C;$ Fig. 10	-	-	4.4	V
		$I_D = 1 \text{ mA}; V_{DS} = V_{GS}; T_J = 175 \text{ }^\circ C;$ Fig. 10	1	-	-	V
I_{DSS}	drain leakage current	$V_{DS} = 75 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 25 \text{ }^\circ C$	-	0.02	1	μA
		$V_{DS} = 75 \text{ V}; V_{GS} = 0 \text{ V}; T_J = 175 \text{ }^\circ C$	-	-	500	μA
I_{GSS}	gate leakage current	$V_{GS} = 20 \text{ V}; V_{DS} = 0 \text{ V}; T_J = 25 \text{ }^\circ C$	-	2	100	nA
		$V_{GS} = -20 \text{ V}; V_{DS} = 0 \text{ V}; T_J = 25 \text{ }^\circ C$	-	2	100	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = 10 \text{ V}; I_D = 20 \text{ A}; T_J = 175 \text{ }^\circ C;$ Fig. 12 ; Fig. 13	-	-	43.2	m Ω
		$V_{GS} = 10 \text{ V}; I_D = 20 \text{ A}; T_J = 25 \text{ }^\circ C;$ Fig. 12 ; Fig. 13	-	13.8	18	m Ω
Dynamic characteristics						
$Q_{G(tot)}$	total gate charge	$I_D = 20 \text{ A}; V_{DS} = 60 \text{ V}; V_{GS} = 10 \text{ V};$ Fig. 14	-	35	-	nC
Q_{GS}	gate-source charge		-	8.28	-	nC
Q_{GD}	gate-drain charge		-	14.24	-	nC

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 25\text{ V}; f = 1\text{ MHz};$	-	1630	2173	pF
C_{oss}	output capacitance	$T_j = 25\text{ }^\circ\text{C};$ Fig. 15	-	274	329	pF
C_{rss}	reverse transfer capacitance		-	115	158	pF
$t_{d(on)}$	turn-on delay time	$V_{DS} = 30\text{ V}; R_L = 1.5\text{ }\Omega; V_{GS} = 10\text{ V};$	-	18.5	-	ns
t_r	rise time	$R_{G(ext)} = 10\text{ }\Omega$	-	22.5	-	ns
$t_{d(off)}$	turn-off delay time		-	44.5	-	ns
t_f	fall time		-	19.8	-	ns
Source-drain diode						
V_{SD}	source-drain voltage	$I_S = 25\text{ A}; V_{GS} = 25\text{ V}; T_j = 25\text{ }^\circ\text{C};$ Fig. 16	-	0.85	1.2	V
t_{rr}	reverse recovery time	$I_S = 20\text{ A}; di_S/dt = -100\text{ A}/\mu\text{s}; V_{GS} = 0\text{ V};$	-	55.4	-	ns
Q_r	recovered charge	$V_{DS} = 30\text{ V}$	-	143	-	nC

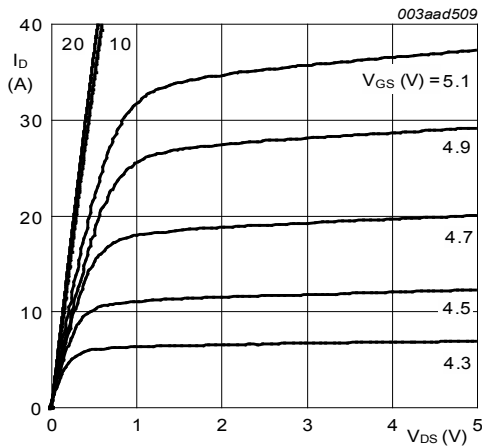


Fig. 6. Output characteristics: drain current as a function of drain-source voltage; typical values.

$T_j = 25\text{ }^\circ\text{C}$

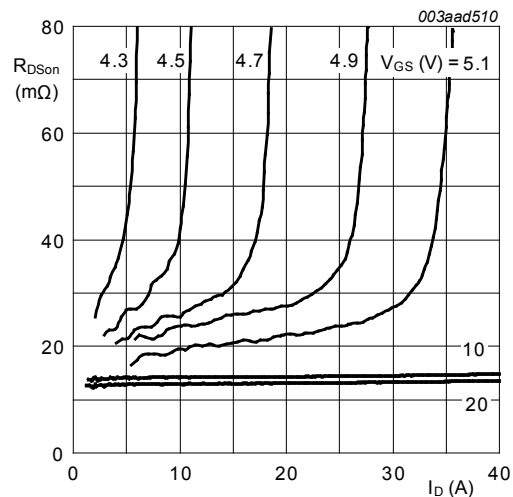


Fig. 7. Drain-source on-state resistance as a function of drain current; typical values.

$T_j = 25\text{ }^\circ\text{C}$

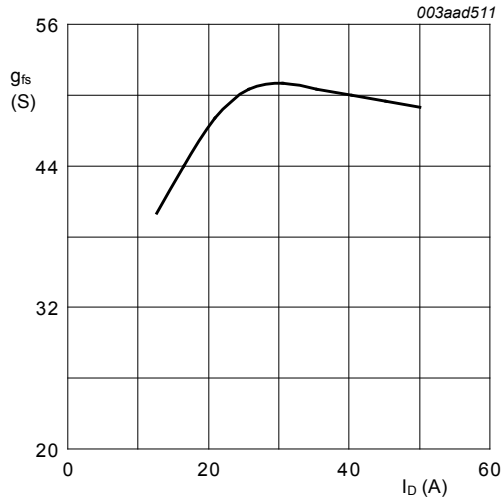


Fig. 8. Forward transconductance as a function of drain current; typical values.

$T_j = 25^\circ\text{C}; V_{DS} = 25\text{V}$

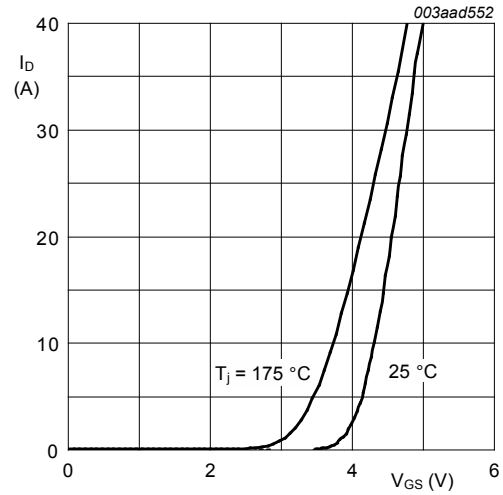


Fig. 9. Transfer characteristics: drain current as a function of gate-source voltage; typical values.

$V_{DS} = 25\text{V}$

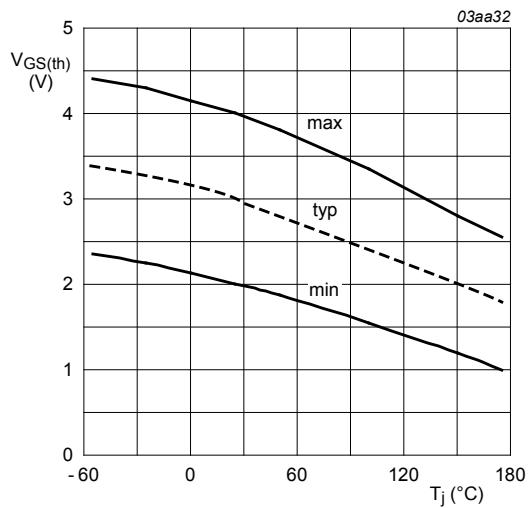


Fig. 10. Gate-source threshold voltage as a function of junction temperature

$I_D = 1\text{mA}; V_{DS} = V_{GS}$

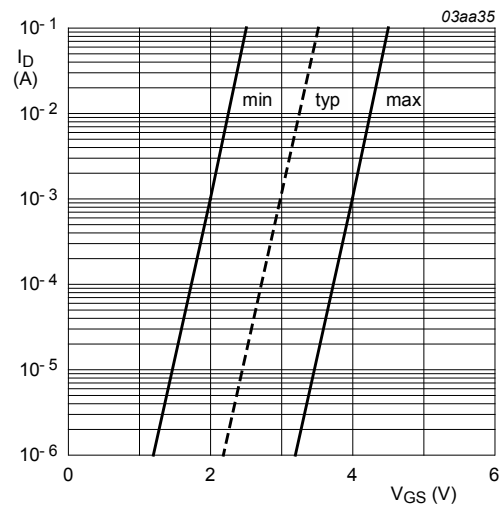


Fig. 11. Sub-threshold drain current as a function of gate-source voltage

$T_j = 25^\circ\text{C}; V_{DS} = 5\text{V}$

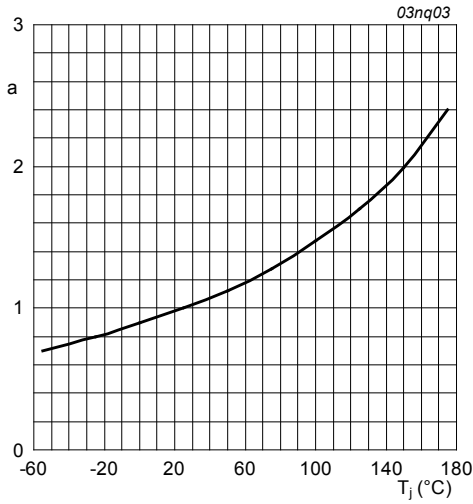


Fig. 12. Normalized drain-source on-state resistance factor as a function of junction temperature

$$a = \frac{R_{DSon}}{R_{DSon(25^\circ C)}}$$

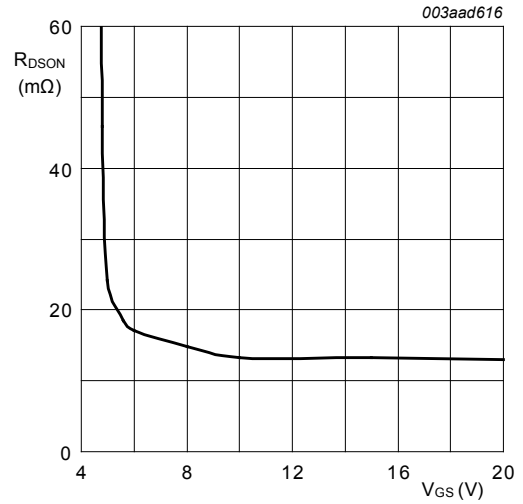


Fig. 13. Drain-source on-state resistance as a function of gate-source voltage; typical values.

$$T_j = 25^\circ C; I_D = 20A$$

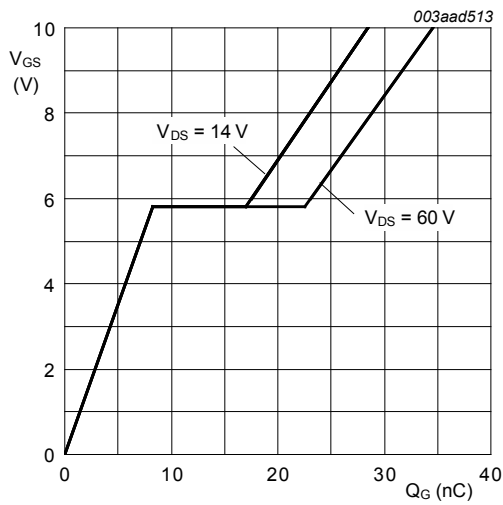


Fig. 14. Gate-source voltage as a function of gate charge; typical values.

$$T_j = 25^\circ C; I_D = 20A$$

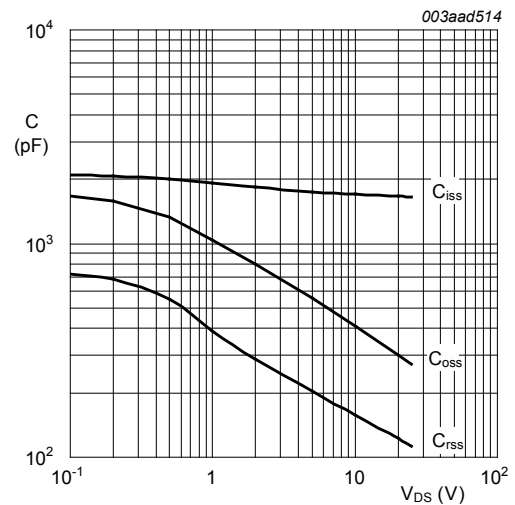


Fig. 15. Input, output and reverse transfer capacitances as a function of drain-source voltage; typical values.

$$V_{GS} = 0V; f = 1MHz$$

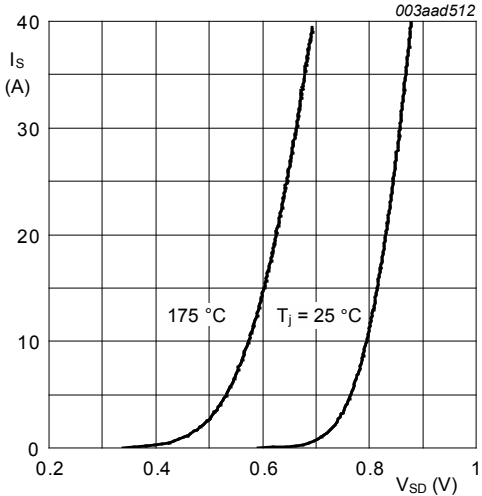
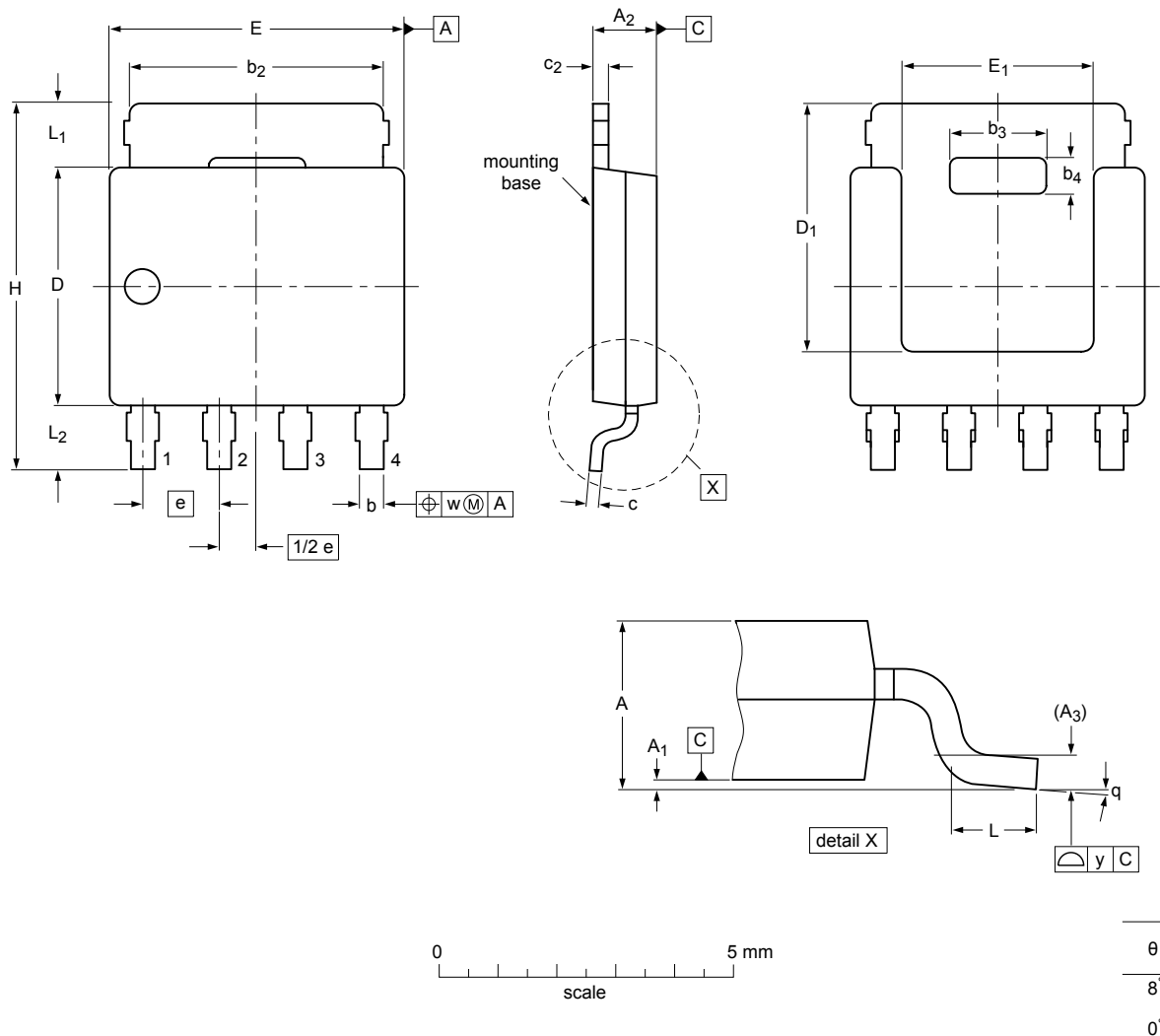


Fig. 16. Source (diode forward) current as a function of source-drain (diode forward) voltage; typical values.

$$V_{GS} = 0V$$

11. Package outline

Plastic single-ended surface-mounted package (LFAK56; Power-SO8); 4 leads SOT669



Dimensions (mm are the original dimensions)

Unit ⁽¹⁾	A	A ₁	A ₂	A ₃	b	b ₂	b ₃	b ₄	c	c ₂	D ⁽¹⁾	D ₁ ⁽¹⁾	E ⁽¹⁾	E ₁ ⁽¹⁾	e	H	L	L ₁	L ₂	w	y
max	1.20	0.15	1.10		0.50	4.41	2.2	0.9	0.25	0.30	4.10	4.20	5.0	3.3		6.2	0.85	1.3	1.3		
nom				0.25											1.27					0.25	0.1
min	1.01	0.00	0.95		0.35	3.62	2.0	0.7	0.19	0.24	3.80		4.8	3.1		5.8	0.40	0.8	0.8		

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

sot669_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT669		MO-235				-11-03-25- 13-02-27

Fig. 17. Package outline LFAK56; Power-SO8 (SOT669)

12. Legal information

12.1 Data sheet status

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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